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EDITORIAL

Machinery Talk in Current Fiction.

Now that machinery plays so important a part in the most ordinary events of every walk of life, it is only natural that current fiction should reflect this tendency and that machinery of one sort or another should play a more or less important part in the average popular novel. Perhaps it is equally natural that the authors of popular fiction should be among the last to be impelled by interest or necessity to acquire some sort of a working knowledge of at least the terminology of machine construction. Mr. Rudyard Kipling comes to mind as a noteworthy exception to this rule, but it is too much to expect that every writer or even a majority of them will ever attain to Mr. Kipling's sympathetic interest in machines and the men who use them.

It does not seem unreasonable, however, to ask that authors who are utterly lacking in any knowledge of the subject refrain from such ludicrous attempts to throw "local color" into their yarns as we find in a description of the engine room of an ocean steamship, for example, in a novel that enjoyed some popularity a couple of years ago. Here is a sample: "They found themselves in a steel-lined gallery, well lighted and fitted on all sides with steel ladders, pipes and valves." This somehow suggests a stage setting, but it does not give rise to real anxiety such as is occasioned by what follows: "The huge rods of metal ascended and fell again with great rapidity, * * * making at each thrust and uplift a rushing, roaring noise like the simultaneous blows of a hundred sledge-hammers." It should be explained that this is not the account of an accident but is incident to the regular operation of the engine that "gives the propellers their thousand revolutions per minute," which is doing pretty well for a marine reciprocating engine.

Just at this point in the description is introduced a blood-curdling anecdote about a poor man who once noticed that the crank needed oil and bravely climbed in to do his duty, although its was almost time for the ship to sail:

> We didn't know he was in the pit, and we pulled the steam-chest lever. The massive arm rose. He shrieked. Before we could stop the machinery, it dropped again, and he was ground to pieces before our eyes.

Our readers may not believe it, but all this is given in the very words of the chief engineer, who is described as "a blunt-spoken Englishman." Some interesting properties of high-pressure steam are noted a little further on, when the chief is supposed to impart further enlightenment to his visiting passengers:

> The vibration you notice is caused by the enormous steam pressure. Two hundred pounds of steam pressing against every square inch of boiler surface represents power equal to the strength of 10,000 horses.

Here we have a rule-of-thumb that tremendously simplifies the whole question of boiler horse-power. Then they proceeded to the stokehold, giving the author another chance to air his really very fine vocabulary:

> Down they went, round and round, threading their way along an amazing labyrinth of valves, levers, gages, eccentrics, tubes and steam-pipes.

The whole subject would be a matter of only trivial importance if this book were the only one of its kind; but the fact is that there seems to be great need of urging upon writers of fiction the advisability of leaving alone subjects of which they are particularly ignorant. The same sort of nonsense can be found on almost any engineering or technical subject, if sufficient search be made; although the author from whom we have quoted is doubtless an unusually persistent offender, throwing in choice bits of careful data at many points where their omission would pass quite unnoticed by the casual reader. For example, the hero steps into an elevator and a few moments later the car is "flying upward at a speed of 50 miles an hour." He arrived safely at the 27th floor, however. Again, the second officer was a bit uneasy, just before the storm that wrecked the steamship with the remarkable engines already mentioned, because the latest barometer reading "marked ten-twenty-nine, which was the lowest he had ever seen it." It seems almost superfluous to add that "the captain, too, was quite uneasy."

A New Book on Pumping Machinery.

Reviewed by NICHOLAS S. HILL, JR.*

PUMPING MACHINERY.—A Treatise on the History, Design, Construction and Operation of Various Forms of Pumps. By Arthur M. Greene, Jr., Professor of Mechanical Engineering, Russell Sage Foundation, Rensselaer Polytechnic Institute. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Cloth; 6 x 9 ins.; pp. 703; 504 text illustrations. $4, net (17/—net).

The author of this volume devotes 130 pages to a historical review and to the recent history of pumping machinery, because he feels "the need of all engineers, of a more intimate knowledge of the great works of the early members of the profession." It is doubtful, however, if such a review will have value in the already crowded curriculum of the technical schools; it will probably have less value for the busy water-works manager, seeking for aid in the selection of the most suitable type of machinery to meet his special conditions.

Although writers give engineering history much less notice than it deserves, the subject is sufficiently important and interesting to occupy a separate field. It is better to segregate it and to place it where it can be found by those who seek it.

The classification of pumps given in the third chapter is not complete or clear, and it is to be regretted that the author has been led into the mistake of loading an already prolific volume with cuts and tables illustrating types and sizes of small auxiliary and special machines—information which is always obtainable from manufacturers and which, owing to improvements and changes, is so transitory as to become obsolete and immaterial in a short time.

Practice in the design of pumping engines has led to empiricism in this, as in most fields of engineering, and it is to be doubted if the analytical methods in the text, relating to the dynamics of the water-end, will have much practical use.

It would have been better had the author given typical conventional diagrams of plant installation to meet specific conditions rather than to have described and illustrated existing pumping stations. The diagrams and illustrations given are of little assistance as a guide to proper pumping-station design.

Other chapters relate to steam-end and water-end details and special pumping machinery, including the injector, pulsometer, air-lift and centrifugal pumps. The author has been unfortunate in illustrating types of special machinery which have not demonstrated their practical efficiency, thus encumbering his work.

An attempt has been made to cover a very broad field, and possibly it would have been practicable to do this if more attention had been given to the classification of the subject matter.

The author has undoubtedly devoted much time, conscientious study and research to his work. This of itself compensates for many defects, particularly at a time when so much haphazard technical matter is put into print. It is, therefore, painful to feel that, after devoting his best efforts to the work, he has failed to grasp the opportunity which exists for a work on pumping machinery which could be used as a guide to the engineer and water-works superintendent in the selection of the most suitable machinery for a specific use, and in the practical layout of pumping plants.

Too much space is devoted to the theoretical side of design, and to descriptive matter, and too little to the use and function of different types of machines, their relative efficiency and cost. The design of pumping engines is limited to a few persons directly connected with pump construction. The method of design, used by them, is the development of years of experience and it is not to be expected that the practising engineer or superintendent will attempt to acquire proficiency in the field of design. Neither can it be hoped to equip the student in the art of design.

The practical questions before the practising engineer and superintendent are, what types of pump are best suited to a specific condition? What is their relative cost and their relative efficiency? Considering efficiency, first cost and other factors, which type is the most economical to install? Having fixed upon the type, the next question naturally relates to installation. Information is desired with relation to boiler sizes and types, steam-piping details, the arrangement of auxiliary machinery and the factors which go to produce the best plant duty in conjunction with the type of pump selected.

The problem which will confront 90% of the engineering students who may subsequently embark in fields requiring a knowledge of pumping machinery will be to select and install, not to design. This is the problem before the great majority of practising engineers and superintendents.

The work of the author partakes more of the nature of a compilation than an expression of views with regard to the proper use and application of different types of machines.

Taken in its entirety, the book is unsatisfactory because it is not an aid in reaching a conclusion. No doubt, however, it could be made valuable by the omission of a large part of the historical and descriptive matter, and the addition of information relating to the selection of pumping machinery, its practical application to specific conditions, as well as relative costs and efficiencies.

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A Notable Collection of Addresses to Engineering Students.

ADDRESSES TO ENGINEERING STUDENTS.—Edited by Waddell & Harrington, Consulting Engineers. Kansas City, Mo.: Waddell & Harrington. Cloth, 6 × 9¼ ins.. pp. 493. $1 for single copies obtained from editors direct, 75 cts. when distributed in quantities through universities or colleges.

Many words of wisdom are addressed to engineering students on various formal occasions by the members of their own faculty or the faculty of some other engineering school, or by practising engineers of note. Some of these get further publicity through college publications or through the technical press, but it has remained for the editors of this volume to gather together and present between the covers of one handy volume many of the best of these occasional addresses. The diversity of occasion on which some of the addresses gathered by the editors were delivered has made it desirable to present many of the addresses in part only, in order to bring the collection within the object of the editors. This object is summarized in the preface of the book as follows:

A. Directing students into right lines of thought and action during their college course.
B. Encouraging students toward the ethical life both before and after graduation.
C. Development among students of a love for the engineering profession.
D. Giving to students a true and adequate conception of the scope and dignity of the engineering profession.
E. Enabling students to obtain the most profit from their technical course.
F. Improvement in students' and young engineers' knowledge and command of the English language.
G. Enabling graduates to develop themselves rapidly, thoroughly and successfully in their professional careers.
H. Finally, though perhaps indirectly, benefiting the engineering profession ethically and in many other ways.

More than forty addresses by over thirty different men are given in whole or in part. Most of the addresses are by college professors, but at least a third of them were delivered by practising engineers. The addresses deal chiefly with engineering education and the work of the engineer, but some of them would be almost equally helpful to any other class of college students. In fact, many of the addresses deal largely with such general subjects as physical, mental and moral training.

Special stress is laid in many of the addresses on the great value of English as a tool for the engineer, on the importance of general culture and on the duty of the engineer to society, especially in various lines of civic endeavor. In an address by Prof. Geo. F. Swain, the value of the study of logic to engineers is emphasized, and attention is called to the fact that this subject rarely finds a place or at least the place which it deserves, in an engineering course.

It will, of course, be impossible to call attention to the many striking and helpful thoughts presented in these various addresses. By way of further specific allusion, however, we will give two quotations. In the address by Col. H. G. Prout, we find an expression of opinion based on extensive observation "that engineers reach the limit of their usefulness from defects of character, rather than from want of technical attainments." In the address by Prof. Swain, to which allusion has already been made, there are some striking remarks on the inefficiency of education in general as measured by relative effort and result. By way of comfort to the educators this striking comparison is made:

> But even if the efficiency is small, it does not follow that the work is not worth doing, or not done well. The light given out by the electric light represents less than 1% of the theoretical energy in the coal yet it does not follow that electrical lighting is not worth while. It depends upon the intrinsic value of the product. So, in education, to inspire and discipline even a few young men may be worth far more than all the effort expended upon them and others for it means keeping alive the torch of learning and feeding the flame of research so that the treasures of thought and the methods of scientific investigation may be transmitted to those who shall follow us and so stimulate intellectual progress in the years to come.

Reverting now to the object and plan of the volume, it may be noted that the editors undertook the work both of compilation and publication at their own expense, with the altruistic object of benefiting the engineering profession in general by bringing these various valuable addresses to engineering students into convenient and accessible form for use as a virtual textbook, or perhaps one should say, reading-book, for students throughout their courses in the engineering schools of the country. Accordingly, the addresses are grouped consecutively in an order suitable for freshmen, sophomores, etc. Moreover, to facilitate the wide use of the book a merely nominal price has been put upon it.

Some of our readers will be interested to know that the volume contains seven addresses or portions of addresses by the editors themselves: two by Mr. Harrington and five by Mr. Waddell. Prof. Vladimir Karapetoff is honored by three addresses, and the late Walter C. Kerr by three. Prof. Ira O. Baker and President Alexander C. Humphries have two numbers each.

Considering the purpose of the collection of addresses, it seems a pity that the time, place and occasion of each address is not given. Sometimes one or the other of these points is covered, and sometimes all of them, but no systematic plan is followed and the information is often incomplete. In many instances more information might also well have been given regarding the respective authors. We say this with all the more assurance because in their introduction to the address entitled "Study Men," by Prof. F. Hayford, the editors quote with approval the following words: "Study the lives of eminent successful engineers," and add as the reason for this, "in order to learn how and why they succeeded; and before reading a technical treatise learn all you can concerning the life history of its author." It certainly would have been a convenience to users of the book if the editors had supplied more information of this very sort regarding the authors whose addresses they present.

Finally, we hardly need say that the authors and publishers deserve the thanks of engineering students, and of the engineering profession as well, for having made accessible to all so many helpful suggestions—many of which may be followed with profit by a large proportion of engineers regardless of the number of years which have passed since they left their college walls.

Malleable Castings.

THE PRODUCTION OF MALLEABLE CASTINGS.—A Practical Treatise on the Processes Involved in the Manufacture of Malleable Cast Iron. By Richard Moldenke. Cleveland, Ohio: The Penton Publishing Co. Cloth; 6 × 9¼ ins.; pp. 113; 35 plates. $3, net.

This treatise on malleable iron production is one of the most practically written books that has recently come to our attention. Its object is to tell how to operate successfully a "malleable" foundry, and it does this from the point of view of the foundry foreman or superintendent, bringing out the points of divergence from the operation of a gray-iron foundry and describing the special apparatus and methods required, with close attention to practical details. Starting out with a brief chapter on the history and development of the malleable iron industry and chapters on the characteristics of malleable iron and the methods of testing it, the author proceeds to take up in succession the steps in the production of malleable castings, from pattern shop to annealing room.

The author's opinion of the field of usefulness of the malleable casting is given in Chapter II., on the "Characteristics of Malleable Cast Iron." He states that the malleable casting lies somewhere between the gray-iron and the steel casting in its properties, as well as in price, and goes on to say:

> It is stronger than the gray casting, but not as strong as cast steel. It can be bent and twisted considerably before giving way and approaches cast iron in compressive strength; but its most valuable characteristic is resistance to shock.

In this last-named characteristic, the malleable casting ranks ahead of steel, in the author's opinion, and should be replaced by steel only where a high tensile strength is essential. An attempt is made to explain this quality of toughness in malleable iron on the basis of the arrangement of crystals as revealed by microscopic examination.

The reader will find scattered through the book many items of interest to general foundrymen as well as to those engaged in the production of malleable iron. The author's remarks on the use of iron molds in the chapter on molding methods are of sufficient interest to be worth quoting here:

> Unless the principles underlying the use of the iron mold are well understood and the mold itself properly built and used accordingly, the subject will remain an *ignis fatuus* in the foundry business. As in the case of the molding machine, the malleable shop offers the best chance for the iron mold, for the characteristics of white iron, with its subsequent annealing, are such that the strains found in gray iron, cast in this manner, are fully eliminated. As attention is now being directed to this subject again, the tests made by the author may be of value. He has always believed that there was a great field for the sandless mold in the malleable shop, and at one time was instrumental in having the matter tried out with a very large casting. Some 500 or more of the castings in question were made from time to time in the same mold and after annealing went duly into service. Then the natural opposition to this method of preparing castings caused the mold to be discarded, otherwise a more complete record of the life of the mold might have been established. Tests on the product showed a slight decrease in the strength of the metal, probably due to a more distinct setting of the crystals of iron at right angles to the metal mold, instead of having an indeterminate mixture of the crystals which is better adapted to secure all-around strength in a casting. The castings themselves weighed some 275 lbs. each, and the preparation and continual use of 50 of these molds would have allowed 250 men in the shop to apply themselves to other more useful vocations.

The arrangement of the material presented in this volume is excellent. Curiously enough, however, there are numerous violations of simple rhetorical principles and even of rules of grammar in the sentence structure. Fortunately this fault is not conspicuous enough to hide the meaning or even to cause much annoyance. The illustrations include numerous sectional views of furnaces used in melting malleable iron.

STUDIES OF THE RELATIVE CORROSION OF METAL PIPES BY WATERS, ESPECIALLY BEFORE AND AFTER PURIFICATION.—Review of Literature on Corrosion. By H. W. Clark and Stephen DeM. Gage. [Reprinted from the 42d Annual Report of the Massachusetts State Board of Health.] Boston, Mass.: Pub. Doc Paper; 5¾ × 9 ins.; pp. 26.

The first part of this reprint is a preliminary report on corrosion studies begun in 1910. Untreated water from the Merrimack River, effluents from slow sand and from mechanical filters, and waters from a pond supply and from a driven-well supply were tested for alkalinity and for iron before, and for iron alone after, standing in various kinds of pipes. In some cases, comparative tests with hot and with cold samples were made. The investigations, so far as carried, give results in accord with observations elsewhere: that is, soft waters, when treated with coagulants in mechanical filters, have greater corrosive effect on iron than when not so treated and also greater corrosive effect than when treated by slow sand filters; usually a given water is more corrosive when hot than when cold; the presence of oxygen is an important factor in corrosion; and galvanized iron is less affected by corrosion than plain iron, but is also subject to progressive attack.

The review of the literature of corrosion is classified under the heads: relation to public health; theories of corrosion; factors in corrosion; and prevention of corrosion. The review consists of a brief summary of no less than 68 articles, papers, reports, etc., accompanied by specific references to the places where the discussions may be found.

Altogether, these two dozen pages contain a large amount of useful information on an important subject, with a plentiful supply of references to full sources.

The August number of the "Quarterly Journal of Economics" (Harvard University, Cambridge, Mass.) contains an article on "Street-Railway Rates, with Especial Reference to Differentiation," by G. P. Watkins, and one on "The German Imperial Tax on the Unearned Increment," by Robert C. Brooks.

Electric Traction.

Reviewed by C. L. DE MURALT.*

ELECTRIC TRACTION AND TRANSMISSION ENGINEERING.—By Samuel Sheldon, A. M., Ph. D., D. Sc.; Professor of Physics and Electrical Engineering, Polytechnic Institute of Brooklyn; Past Prest. Am. Inst. E. E., and Erich Haussmann, E. E., M. S., Instructor in Physics and Electrical Engineering, Polytechnic Institute of Brooklyn, and Assoc. Am. Inst. E. E. New York: D. Van Nostrand Co. Cloth; 5½ × 8 ins.; pp. 307; 127 text figures. $2.50, net.

Professor Sheldon, already well known for his two books on Dynamo-Electric Machinery, has just finished what may be termed the first comprehensive American treatise on the subject of electric traction. The book is admirable from beginning to end. The only real criticism that can be uttered against it is that it tries to cover an exceedingly broad subject in a very small compass. Prof. Sheldon himself seems to fully realize this limitation for his work. He has picked his material with the greatest possible care, eliminating everything superfluous or of secondary importance, and presenting, so to speak, only the essentials of his subject.

The result is a very concise and exceedingly readable book, which will no doubt prove of great value as a text-book for university instruction. It will surely give splendid results for this purpose, because it will save the student from becoming swamped under a mass of details which he can digest only with difficulty, yet it furnishes him with a complete groundwork upon which to build as experience enlarges his views.

The practicing electrical engineer and the railroad man might like to have greater detail on some of the items and Prof. Sheldon will confer a great boon on the profession if he will take the trouble to write a second book on the same subject, using the present volume as a basis, but filling in here and there, so as to treat the matter with a closer approach to completeness. The subject will stand a book of double the size of the present one.

One very good feature of the volume before us is the fact that it does not enter into the polemic of the system enthusiasts. It briefly and simply states the characteristics of each type of motor and leaves it to the reader to draw his own conclusions from the facts.

The first half of the book, Chapters I. to VI., covers the traction question proper. Starting with a consideration of the characteristics of track and rolling stock the author leads us to the calculation of the tractive effort required for the propulsion of cars under varying conditions. Then he explains the different types of traction motors and their performance characteristics, shows how speed-time curves may be used to graphically represent what happens during the run of any given car, and finally and in detail explains the topics of railway motor control and energy consumption.

The second half of the book, Chapters VII. to X., relates to the questions of generation and distribution of electrical energy and it covers the ground as fully as is possible under the circumstances. It not only deals with the different types of conductors used in railway practice and the different kinds of substations, but it also contains a concise, yet very thorough, treatise on the subject of high-tension transmission lines, in the course of which the advantages of hyperbolic functions in electrical calculations are briefly set forth and their use explained. The treatment of the topic, power stations, is of necessity cursory only, yet it covers steam as well as hydraulic stations and gives valuable hints for the selection and dimensioning of the various elements of both, so as to ensure good operating results in either case.

Throughout the entire book the subject matter is illustrated by carefully-made calculations of actual cases and at the end of each chapter are appended a number of problems which will allow the student to test his grasp of the subject.

The publishers have used great care in the preparation of the book. Paper, prints and cuts are very good, and the price is such as should ensure this little volume the wide distribution which it deserves.

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The Pros and Cons of the Commission Plan of City Government.

CITY GOVERNMENT BY COMMISSION.—Edited by Clinton Rogers Woodruff. New York and London: D. Appleton & Co. Cloth; 5 × 7½ ins.; pp. 381. $1.50, net.

For seventeen years past the National Municipal League has been holding conventions at which serious and fruitful discussions of a variety of municipal topics have taken place. The earlier discussions were confined largely to pointing out the evils then current in municipal government throughout the country at large and the great need for reform on every hand. Now and then, however, a note of encouragement was sounded. These notes have increased in frequency and volume as time has gone on.

That the League has contributed in no small degree to the improvement in municipal conditions which has taken place during the past two decades, no one at all familiar with the history of municipal government in the United States would deny. One of the most notable of these contributions by the League was a Municipal Program, which was virtually a model municipal charter. This document, with supporting constitutional amendments to make it adoptable throughout the country and with explanatory papers presented at various sessions of the League, set forth in a clearer light than had ever before been presented many of the fundamental principles of municipal government—or at least a hopeful, workable municipal government under conditions existing in the United States. Some or all of the fundamental principles in the municipal program found their way into a large number of charters of American cities.

Notable among the principles of the municipal program stood out one which involved as complete as possible a separtion of legislative and executive functions. Strangely enough, while this principle was being advocated and adopted throughout the country, there sprang up a system of municipal government which in some respects is at utter variance with the one just noted. We refer to the so-called commission plan of city government, the leading principle of which is the placing of both legislative and executive functions in one body instead of separating them as completely as possible.

That the guiding spirits of the National Municipal League have not made themselves partisans for the municipal program, but have welcomed the trial of all promising ideas in municipal government, is evidenced by the number of papers on the commission plan which have been read before the League since that plan was fairly launched. The Secretary of the League, Mr. Clinton Rogers Woodruff, has rendered a service by bringing these papers together in the volume before us, supplementing them by discussions of the commission plan which have appeared elsewhere and binding together what would otherwise have been a more or less heterogeneous mass by editorial comments of his own. It should be understood that arguments for and against the commission plans are presented without fear or favor for either side.

A particularly useful chapter of the volume is a list of cities which had adopted the commission plan up to the early part or middle of the year 1911. These cities are arranged geographically and their populations are given. Their total reaches the surprising number of 156, of which one is in Canada and the others in the United States. In addition, it is stated that 267 cities were considering the commission plan when the book was being prepared for publication. Interesting and helpful is a second list of cities, some 50 in number, which had rejected the commission plan up to June 15, 1911.

The commission plan originated at Galveston, Texas, in 1901. It was adopted by a few cities here and there in the next few years, but did not begin to sweep over the country until after its adoption in modified form by the city of Des Moines in 1908. It is therefore fitting that the volume before us should include a reprint of the Des Moines Charter, which has served as a basis for discussion and as model for many cities ever since its enactment.

The fact that within a single decade one hundred and fifty cities have adopted the commission plan and fifty rejected it, while at any time within the past year or two, two hundred cities could be found which had the plan under consideration, is sufficient warrant for publication not only of the present volume but also of the others on the commission plan which have preceded it.* The present volume, being the latest in the series, is the most complete in some particulars, and is perhaps the most satisfactory for the general reader of any which has thus far appeared. It contains little original matter, but more than one would expect in what is essentially a compilation. It will save many a student of the subject the necessity of having recourse to numerous scattered sources of information. The editorial comments possess the advantage of having been made by one who has followed not only the progress of the commission plan, but who has also keenly surveyed the whole municipal field in all its varied aspects for twenty years or more.

PRACTICAL INSTRUCTOR AND REFERENCE BOOK FOR LOCOMOTIVE FIREMEN AND ENGINEERS.—By Charles F. Lockhart, Practical and Technical Locomotive Engineer. New York: The Norman W. Henley Publishing Co. Cloth; 5 × 7 ins.; pp. 382; 88 text illustrations. $1.50, net.

Written by one who has had, according to the introduction, "years of experience in locomotive shops and on the road as a fireman and engineer," this book should be of much practical value. It will interest not only firemen and engineers, but any others who may wish to learn something of the construction and operation of a modern locomotive.

The book is divided into six parts, of which the first treats of the fireman's duties, and the second of boiler and engine construction, with special attention to valve gears. A description of the Walschaert gear is included. Part III. discusses locomotive break downs, and describes their remedies. Part IV. describes the Westinghouse air-brake system. This is the largest part of the book, comprising about one-third of the total number of pages. Part V. opens with extracts from the standard code of train rules, and includes brief instructions for economic locomotive operation. The sixth part is made up of a list of examination questions, designed to give a thorough review of the whole book. The paragraphs throughout the book are numbered, and these questions are numbered to correspond, the answer to any question being found by reference to the paragraph of the same number.

ISOMETRIC DRAWING.—A Treatise on Mechanical Illustrating, Dealing with Typical Constructions and Outlining: A Course in the Art. By Alpha Pierce Jamison, M. E., Professor of Mechanical Drawing, Purdue University; Jr. M. Am. Soc. M. E.; Author of "Elements of Mechanical Drawing," "Advanced Mechanical Drawing," etc. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9½ ins.; pp. 69; 7 plates and 58 text figures. $1, net.

The student taking up the course outlined in this book is credited with being already well-grounded in elementary descriptive geometry and mechanical drawing; hence no space is given to preliminary discussions of drawing instruments and their use. After briefly outlining the uses made of isometric drawings, the author at once takes up the explanation of the isometric rendering, first of plane figures with straight lines, and then of those with curved lines. Following is a chapter on solids which puts into immediate use the constructions previously explained. The fourth and last chapter contains five sheets of exercises, each with one page of text in explanation. The book is designed to teach how to make isometric drawings rather than to explain the theory of isometric projection, which may be found in any work on descriptive geometry.

*The latest of these was reviewed on p. 19 of this Supplement for Sept. 14, 1911; a foot-note gave a list of the previous books on the same subject, with the dates on which they were reviewed in these columns. Mr. Woodruff's book, here reviewed, contains a list of articles as well as books based upon the bibliography in Prof. McGregor's book.

The Testing of Power Apparatus.

THE TESTING OF ENGINES, BOILERS AND AUXILIARY MACHINERY.—A Treatise on the Construction and Use of the Instruments and Methods Employed in the Testing of Prime Movers in the Laboratory and Workshop. By W. W. F. Pullen, Whitworth Scholar; M. Inst. M. E., M. Inst. C. E. Second Edition [Originally named "Experimental Engineering"] Manchester, England: The Scientific Publishing Co. Cloth; 6 × 9 ins.; pp. 730; 700 illustrations. Price, 12s. 6d., net; American price, $5.

POWER PLANT TESTING.—A Manual of Testing Engines, Turbines, Boilers, Pumps, Refrigerating Machinery, Fans, Fuels, Materials of Construction, Etc. By James Ambrose Moyer, S. B., A. M.; M. Am. Soc. M. E.; Am. Inst. E. E.; Professor of Mechanical Engineering in the University of Michigan. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9¼ ins.; pp. 422; 271 text figures. $4, net.

These two books, covering essentially the same ground, come to notice at the same time and invite comparison. Each author naturally has a different viewpoint, geographically different at least, which is bound to be reflected in the contents of each book. The first work might be expected to describe British apparatus largely, and it is perhaps surprising to note the great number of American appliances which are shown. Mr. Pullen has evidently intended his book as a text for English students and a reference for English engineers, so we may readily suppose that his pages reflect the relative numbers of home and foreign appliances in service in Great Britain.

The range of power-test apparatus found in service in this country is similarly presented by Prof. Moyer, and it will be surprising to many readers of Mr. Pullen's book not to find here the same proportion of foreign devices. However, Prof. Moyer has not described such a great number of pieces of apparatus, all told, as has Mr. Pullen.

We have noted that the two books cover much the same field. The American work has a somewhat wider scope, as it includes the testing of gas producers, ventilating systems, refrigerating plants, and even ventures into that large field, the strength of materials. The English book pursues detail further than does the American, and presents a greater variety of methods and apparatus.

Mr. Pullen, as an introduction, reminds his readers of the objective points of a test and the errors that are likely to creep in. His first chapter contains tables of data and a discussion of them, which may be found in various other mechanical-engineering books. An attempt seems to have been made to have the book a self-contained manual. The following chapters describe planimeters, gages, thermometers, and tachometers, and devices and methods of calibrating them. The "direct" measurement of power is presented under three heads: (1) output dynamometers, like the various weighing brakes; (2) input dynamometers, including belt, pulley, gear and torsion types, and (3) steam-engine indicators. The construction of various indicators and appurtenances is gone into deeply. Over a third of the pages are given over to these topics and to steam-engine testing generally. After this is matter on analyzing fuels and flue gases, preliminary to the larger subject of boiler testing. Toward the close of the volume are described tests for auxiliary power-plant machinery, internal combustion motors. The work finally tapers off in a series of appendices on slide rules, the Rankine cycle, flue-gas, temperature-entropy diagrams, steam meters, etc.

The first chapters of Prof. Moyer's book describe instruments for measuring pressures, temperatures, and small areas, and for determining the amount of moisture in steam. The descriptions of engine indicators, reducing motions, etc., which follow are comparatively brief, but much attention is paid to manipulation and calibration. The various types of dynamometers are covered in a short chapter, which is followed by other short sections on gas and water meters, fuel calorimeters, and flue-gas-analysis apparatus. When we come to boiler and engine testing, the treatment necessarily requires more space, as the widely used and very complete codes of the American Society of Mechanical Engineers form the basis of the recommendations. The sections on testing turbines, gas producers and internal-combustion motors, and on correcting test results, are noteworthy. The closing chapters round out the work as a text on general testing, and acceptably outline approved methods of fans, compressors, pumps, refrigerating machines, hot-air engines, hoists, belts, hydraulic turbines and impulse wheels, injectors, etc. The final chapter, on testing for the strength of materials, is necessarily restricted to a few of the most important methods of determining tensile and compressive strengths. The author's single appendix contains a short steam table and a list of the physical properties of common substances.

Appreciative readers of these two books will commend Mr. Pullen's for its completeness as a reference and Prof. Moyer's for the comprehensive view which it gives. Critics will probably complain of a confusing mass of detail in the first if they wish to use it for a handbook, and of a silence about some pieces of new apparatus in the second, if they regard the latter also as a reference.

Mechanical Power in Agriculture.

POWER AND THE PLOW.—By L. W. Ellis and Edward A. Rumley. [Temporary publishers: M. Rumley Co., La Porte, Ind., after 1911, Doubleday, Page & Co., Garden City, N. Y.] Cloth; 5 × 7½ ins.; pp. 318; 22 text illustrations. $1.50 post paid.

So far as we can recall this is a pioneer book on power-plowing—if we may use the term "power-plowing" to distinguish the use of mechanical power in place of animal. There have been books on plows and plowing—scores of them, and as many more on steam and gas engines. But not before, we believe, has there been one dealing with the kind of engines which are adapted for farm conditions or the kind of plows suited to use with large and powerful tractors. This is a book which the mechanical engineer and engine designer should read for what it contains about the development of the plow, the principles of plow design and for its views on agriculture. It is a book which the farmer should read for insight into things mechanical, into the physics and chemistry and economics of mechanical power.

The book opens with a feverish sort of a chapter picturing a traction-plow contest in Manitoba. It seems strange to the engineer-reader, used to a quick get-away to the most important matters, to encounter here first of all a lurid pen picture. However, that style is not followed and the engineering reader finds himself in more familiar atmosphere when he reaches the second chapter. Yet, withal, he will return to this opening, first with tolerance of the authors' evident enthusiasm, and later, perhaps, with some sort of their spirit.

The early chapters describe the common sources of power, define power, work and energy, and describe the common ways of measuring power furnished or work done. Then there are three good chapters on man's equine friend—not the collection of mere deprecating remarks one might look for, but a critical study of the animal and its economic place beside the modern heat motor. The steam traction engine gets the next three chapters and the internal-combustion-engine tractor is presented in three more. This matter shows the historical development, outlines simply principles of action, and describes the important parts. The available and most-used fuels for both kinds of machines are given special emphasis. The authors then turn to the plow, trace its development, and expose the features which have made this device a more efficient tool in breaking up the soil for cultivation. The sorts of plows that are to be used with the high-power tractors (powerful compared with a horse), and the kind of plowing that is needed are not forgotten.

The miscellaneous chapters that fill out the book all have an important function in rounding out the authors' discussions of the engineering and economics of mechanical power applied to agriculture. The titles of a few of the chapters need only to be mentioned to suggest their bearing: "Substitutes for the Tractor;" "Animal-Mechanical Tillage"; "General-Purpose Motor"; "Business Management in Traction Plowing"; "The Traction Engine in Dry Farming"; "Traction Farming in the Corn Belt"; "Power and the Food Supply"; "Choice of Power"; "Future of the Traction Engine."

Naturally, the book is not without defects; there are minor points where the explanations are not the best. The most serious criticism to be made is of the too sparing use of illustrations where words alone necessarily fail to convey a clear idea of a construction or a device. This is most felt in describing the parts of a tractor and the mechanical development of the plow.

BUILDING IN LONDON.—A Treatise on the Law and Practice Affecting the Erection and Maintenance of Buildings in the Metropolis. By Horace Cubitt, A. R. I. B. A., F. A. S. I. With special chapters dealing respectively with The Cost of Building Work in and around London, by H. J. Leaning, F. S. I., and The Valuation, Development, and Rating of London Property, by Sydney A. Smith, F. S. I., Gold and Silver Medallist, and "Driver" Prizeman of the Surveyors' Institution. London: Constable & Co., Ltd. (10 Orange St., Leicester Sq., W. C.) Cloth; 6½ × 10 ins.; pp. 800. 31s. 6d., net; American price, $12.60, net.

The requirements that govern the erection of buildings in the city and county of London are contained in more than forty Acts of Parliament and a number of by-laws and regulations, nearly all of which have been subjected to judicial interpretation. This includes not only the so-called building code, which controls the details of construction, but also all provisions affecting frontage, height, air-space and sanitary requirements. It may be readily seen, then, that any compendium of all the official stipulations concerning buildings in that immense area known as London must be not only an extensive but a detailed work. Such a work is the one prepared by Mr. Cubitt.

It contains a description of the extent of the city and county of London, and of the various administrative authorities therein. There are chapters on streets and sanitation, frontage, height and air-space, construction (building codes), and on the various provisions affecting buildings, such as the laws as regards dangerous structures, means of escape, applications, appeals, etc. These subjects are all treated descriptively, and are followed at the end of the book by transcripts of the more important laws governing the cases. In addition the general rulings of the courts are in every instance noted by some representative cases.

This section is followed by chapters, by H. J. Leaning, on the "Cost of Building in and Around London" and one by S. A. Smith on "London Property," with a treatise on property values in the city.

In all, the work is monumental and of very distinct value to those owning or building structures in the British capital. To American readers it has only a comparative value. It is probable that the designers of building laws or regulations in this country might consult it with profit.

THE PRINCIPLES OF AEROPLANE CONSTRUCTION.—With Calculations [and] Formulæ. By Rankin Kennedy, C. E. New York: D. Van Nostrand Co. Cloth; 5¼ × 8½ ins.; pp. 137; 50 diagrams in text. $1.50, net.

The author introduces his subject with a short dissertation on mechanics—presenting elementary concepts of force, mass, acceleration, work, power, etc. Closer approach to the action of planes advancing in air is through consideration of the inclined plane. The author, however, is unfortunate in not clearly preserving the distinction between acceleration and velocity, with the result that confusion exists unless one is well enough versed to see through the ambiguity and inexcusable looseness of expression. If the author had also clearly shown that he was using velocity of air deflected from a wing to express the acceleration given to air coming in contact with the wing and producing the supporting reaction, then his book would have been helpful. It is now useless to the ordinary student since

this confusion of velocity and acceleration extends largely throughout the theoretical portions of the volume. The application of the theory of the inclined plane to the curved wing set forth, and this is followed by the comparison of the older empirical formulas for lift, etc. Then some matters of experience and practice in design are discussed, the utility of which may be gathered by noting that of the Wright machines only the older tailless variety are mentioned. Propeller design and construction, the possibility of a screw-supported flyer, engine construction, etc., are covered briefly. Under "the future of the aeroplane" the author argues for greater factors of safety in construction, greater stability in the air, and a greater margin of engine capacity.

A Handbook for Building Contractors.

THE CONTRACTORS' AND BUILDERS' HANDBOOK.—By William Arthur, Author of "The New Building Estimator." New York: David Williams Co. Cloth; 4½ × 7 ins.; pp. 378. $2, net.

Under the heading given above our author has collected from various sources some data of real value to the "practical" building contractor, a type quite familiar to those who have had to do with construction work. Through the medium of these data our author has taken an opportunity of presenting his views on contracting and on a variety of other subjects more or less distantly related to it.

Starting out with an exposition of the relations of the contractor and the architect, the architect is at once attacked as the source of all contractors' troubles. "One of the banes of a contractor's life is the architect newly let loose from school and full of educated ignorance," says our author; and this thought seems to have haunted him through several of the chapters that follow. That much cause exists for this point of view is a matter that should, perhaps, be more often brought to the attention of the young technical graduate.

Much good and homely advice is given on the best method of handling employees, estimating on building work and about contracts in general. Helpful suggestions are also given on office equipment, bookkeeping and cost keeping; the small contractor is warned against too much "system." A chapter on building law is designed to present a few "pointers" to keep builders away from the law as much as possible—surely a laudable intention.

About one-half of the book contains the data one would expect to find in a contractor's handbook; tables of weights and measures, squares and square roots, weights of flooring material, bearing power of soils, thickness of brick walls, safe loads on beams and columns, tables for reinforced-concrete construction, etc. These are gathered from manufacturer's pocketbooks and from other handbooks, such as Kidder's and Richey's.

Several chapters toward the close of the volume take up the contractor as a taxpayer and citizen. The subjects covered include a chapter on fire loss and safe building construction, on the best place for a contractor to locate his business, and on the education of the contractor and architect. In the last we are given in more detail the ideas of the author regarding disqualifications of the young technical graduate, and the need for a greater number of trade or vocational schools.

The book is concluded with a list of reference books on construction and allied subjects, a chapter which is entitled "Big Contracts," treating of the great building undertakings of the past, including Solomon's Temple and the Chinese Wall, and a chapter of miscellaneous matter on the metric system and the height of buildings. A very fair index adds to the value of the contents, which, as one may judge from this outline, form a rather heterogeneous mixture.

A number of articles on various phases of employers' liability make up the greater part of the September number of "Case and Comment" (Rochester, N. Y.).

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Publications Received.

BITUMINOUS COAL PRODUCTION AND SHIPMENTS IN PENNSYLVANIA, MARYLAND AND WEST VIRGINIA, 1910.—Published by the Bituminous Coal Trade Association, 1 Broadway, New York City; Henry S. Fleming, Secy.-Treas. Stiff paper; 7 × 10 ins.; pp. 91; gratis.

BULLETINS, DEPARTMENT OF THE INTERIOR, BUREAU OF MINES.—Joseph A. Holmes, Director. Washington, D. C.: Pub. Docs. Paper; 6 × 9 ins.

No. 17: A Primer on Explosives for Coal Miners. By Charles E. Munroe and Clarence Hall. [Reprint of U. S. Geological Survey Bulletin 423.] Pp. 69; 10 plates and 12 text figures.

No. 20: The Explosibility of Coal Dust. By George S. Rice, with chapters by J. C. W. Frazer, Axel Larsen, Frank Haas, and Carl Scholz. [Reprint of the U. S. Geological Survey Bulletin 425.] Pp. 204; 14 plates and 28 text figures.

BULLETINS, U. S. GEOLOGICAL SURVEY.—Department of the Interior; George Otis Smith, Director. Washington, D. C.: Pub. Docs. Paper; 5¾ × 9 ins.

Nos. 470-C and 470-G: Advance chapters from "Contributions to Economic Geology" (Short Papers and Preliminary Reports), 1910. Part I.—Metals and Nonmetals Except Fuels. C: Structural Materials. By Charles Butts, T. N. Dale, G. B. Richardson, E. W. Shaw, Alexander Deussen, and E. F. Burchard. Pp. 134; 4 plates and 9 text figures. G: Copper. By Sidney Paige, W. H. Emmons and F. B. Laney. Pp. 47; one map and 12 text figures.

No. 442-J: Alaska Coal and Its Utilization. By Alfred H. Brooks. [Extract from Bulletin 442, "Mineral Resources of Alaska, 1909."] Pp. 100; one map.

No. 474: Coals of the State of Washington. By E. Eggleston Smith. Work done in cooperation with the Geological Survey of Washington. Pp. 206; 8 plates.

COLLEGE PHYSICS.—By John Oren Reed, Ph. D., Professor of Physics in the University of Michigan and Dean of the Department of Literature, Science and the Arts, and Karl Eugen Guthe, Ph. D., Professor of Physics in the University of Michigan. New York: The Macmillan Co. Cloth; 5⅛ × 8⅛ ins.; pp. 622; 328 text figures. $2.75, net.

ELECTRIC TRACTION FOR RAILWAY TRAINS.—A Book for Students, Electrical and Mechanical Engineers, Superintendents of Motive Power and Others Interested in the Development of Electric Traction for Railway Train Service. By Edward P. Burch, Consulting Engineer, Mem. N. Y. R. R. Club; M. Am. Inst. E. E.; Lecturer on Electric Railways, University of Minnesota. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9½ ins.; pp. 583; 183 text figures. $5, net.

THE ELEMENTS OF ELECTRICAL TRANSMISSION.—A Text-Book for Colleges and Technical Schools. By Olin Jerome Ferguson, Assoc. Prof. of Electrical Engineering in Union College; M. A. I. E. E.; M. N. E. L. A.; M. Soc. From. Eng. Ed. New York: The Macmillan Co. Cloth; 5⅛ × 8⅛ ins; pp. 457; 273 text illustrations. $3.50, net.

HIGHWAY BRIDGES AND CULVERTS.—By Charles E. Hoyt, C. E.; Superintendent of Construction, in Charge of Bridge Engineering, Office of Public Roads, and William H. Burr, C. E., Professor of Civil Engineering, Columbia University; Consulting Engineer, Office of Public Roads. Bulletin No. 39—Office of Public Roads, U. S. Dept. Agriculture; Logan Waller Page, Director. Washington, D. C.: Pub. Doc. Paper; 6 × 9 ins.; pp. 22; 14 plates and 3 text figures.

JOINT COMMITTEE ON REINFORCED CONCRETE.—Second Report: London; The Royal Institute of British Architects (9 Conduit St., Regent St., W.) Boards; 6 × 9¾ ins.; pp. 48; illustrated. 1s.; American price, 40 cts., net.

THE JOURNAL OF THE IRON AND STEEL INSTITUTE.—Vol. LXXXIII. [Containing Proceedings of Annual General Meeting, London, May, 1911.] Edited by George C. Lloyd, Secy. London: E. & F. N. Spon, Ltd. (57 Haymarket). New York: Spon & Chamberlain. Sold also at the Offices of the Institute, 28 Victoria St., London, S.W. Cloth; 5½ × 8¾ ins.; pp. 753; 56 plates and many text figures.

LANGLEY MEMOIR ON MECHANICAL FLIGHT.—[Vol. 27, No. 3, Smithsonian Contributions to Knowledge.] Part I., 1887-1896. By Samuel Pierpont Langley. Edited by Charles M. Manly. Part II., 1897-1903. By Charles Manly, Assistant in Charge of Experiments. Washington, D. C.: The Smithsonian Institution (Charles D. Walcott, Secy.) Paper; 10 × 13 ins.; pp. 320; 101 plates.

MASCHINENTECHNISCHES LEXIKON.—Herausgegeben von Ing. Felix Kagerer. Parts 2 to 7. Wien: Verlag der Druckerei-und Verlags-Aktiengesellschaft, vorm. R. v. Waldheim, Jos. Eberle & Co. Paper; 7 × 10½ ins.; pp. 240; illustrated. Price per part, 80 h. = 70 pf. = 95 cts.

NATIONAL BOARD OF FIRE UNDERWRITERS.—Rules and Requirements as recommended by the National Fire Protection Association for the construction and installation of Rotary Fire Pumps; Electric Wiring and Apparatus. New York: The Board, (135 William St.) Paper; 3½ × 5½ ins.; pp. 44 and 190; illustrated.

OFFICIAL YEAR-BOOK OF THE COMMONWEALTH OF AUSTRALIA.—Containing Authoritative Statistics for the Period 1901-1910 and Corrected Statistics for the Period 1788-1900. No. 4, 1911. Published under the authority of the Minister for Home Affairs, by G. H. Knibbs, C. M. G., Commonwealth Statistician. Melbourne: Pub. Doc., Commonwealth Bureau of Census and Statistics. Boards; 6 × 9¾ ins.; pp. 1,230; 14 maps and many diagrams.

PHYSICAL OPTICS.—By Robert W. Wood, L. L. D., Professor of Experimental Physics in the Johns Hopkins University. New and revised edition. New York: The Macmillan Co. Cloth; 5¾ × 9 ins.; pp. 705; two plates and 399 illustrations in text. $5.25, net.

PRACTICAL THERMODYNAMICS.—A Treatise on the Theory and Design of Heat Engines, Refrigeration Machinery, and Other Power-Plant Apparatus. By Forrest E. Cardullo, M. E., M. Am. Soc. M. E.; Professor of Mechanical Engineering in the New Hampshire College of Agriculture and the Mechanic Arts. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9½ ins.; pp. 411; 224 text figures. $3.50, net.

PRINCIPLES OF ELECTRICAL ENGINEERING.—By Harold Pender, Ph. D., Professor of Theoretical and Applied Electricity, Massachusetts Institute of Technology, Mem. A. I. E. E. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9½ ins.; pp. 438; 138 text figures. $4, net.

REINFORCED CONCRETE.—Mechanics and Elementary Design. By John P. Brooks, Director Clarkson School of Technology; Formerly Associate Professor of Civil Engineering, University of Illinois. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9½ ins.; pp. 220; 87 text figures. $2, net.

THE SEWERAGE SYSTEM OF CHICAGO.—By C. D. Hill, M. W. S. E., and "Sewage Disposal in the United States and Abroad." By Langdon Pearse, M. W. S. E. [Reprinted from the Journal of the Western Society of Engineers, September, 1911.] Chicago, Ill.: The Sanitary District of Chicago. Paper; 6 × 9 ins.; pp. 45; illustrated.

SHIPYARD PRACTICE AS APPLIED TO WARSHIP CONSTRUCTION.—By Neil J. McDermaid, Mem. Royal Corps of Naval Constructors; Late Instructor on Practical Shipbuilding at the Royal Naval College, Devonport. London, New York, Bombay and Calcutta: Longmans, Green & Co. Cloth; 6 × 9½ ins.; pp. 328; many diagrams in text. $4, net.

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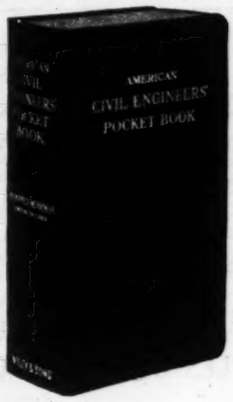

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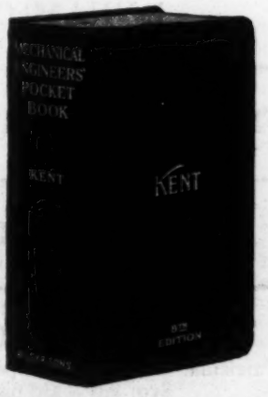

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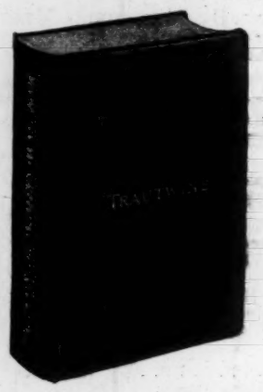

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